

Most of the surficial deposits in the northern part of the Big Fork-Avon area were formed in the latter stages of the last ice age--the Pinedale glaciation of the Pleistocene--during the advance and waste of several large glaciers. These deposits mantle the lower flanks of the mountains and form the valley floors; they have been dissected and eroded somewhat by modern streams, but most still appear much as when they were formed.

For ease of discussion and to avoid the complexities of glacial nomenclature these deposits have been grouped into two categories, older and younger. The "older" deposits were likely formed either during early or middle Pinedale time, and the "younger" deposits during the late Pinedale. It is possible that in some localities deposits of more than one ice advance have been included in one or the other category.

Deposits of the older ice are identified on the map by the letter "o" added to the symbol, thus "Qto," is, "till of the older ice."

Deposits of the younger ice are identified on the map by the letter "y" added to the symbol, thus "Qoy," is, "outwash of the younger ice."

Locally, along the length of the Swan Valley, deposits of former small tributary glaciers extended into the main valley. These deposits have been mapped separately and are identified by appropriate symbols, thus "Qth," is, "till of the Holland Lake ice."

Qal	Qf	Holocene	QUATERNARY
Qoo	Qofo		
Qto	Qtor	Pleistocene	
UNCONFORMITY			
pCb			PRECAMBRIAN

Qa1 ALLUVIUM (HOLOCENE)—Stream-deposited unconsolidated silt, sand, and gravel. Commonly forms the floor of major stream valleys, as well as of the now-abandoned meltwater channels of former glaciers. Locally includes small deposits of colluvium and other mass-wasting debris. Overlies and normally masks outwash sand and gravel deposited by meltwaters from the retreating glaciers.

Qf ALLUVIAL FAN (HOLOCENE)—Broad, cone-shaped, gently sloping, light-brown to brown deposit of unconsolidated to semiconsolidated moderately sorted silt, sand, and gravel formed at valley mouth. Locally contains thin sheets of gravel 1/3-1/2 m (1-2 ft) thick.

FINEDALE GLACIOTITE (HOLOCENE)

Qeo Outwash deposited by older ice—Even-surfaced, gently sloping deposit of unconsolidated, well bedded and well sorted silt, sand, and gravel that fills outwash channels, and that forms a broad deposit some 3 to 5 m (10-15 ft) above the alluvial floor of Clearwater River. Clasts range in shape from subangular to well rounded; none are well rounded. About 75 percent of unit is composed of clasts that range in size from about 5 mm to about 76 mm (1/4-3 in.); about 15 percent consists of a fine to coarse sand with included small pebbles as much as 5 mm; and the remaining 10 percent is fine silt and clay. Locally sand and gravel gives way to light-brown silt. In thin beds, the silt is composed of clasts that range from about 3 mm to 13 mm (1/8-1/2 in.); the remainder of the unit is fine to medium sand (84 percent) and silt (15 percent). Well rounded cobbles are common. Tan quartzite and sandstone clasts predominate; other prominent types include green, gray, and purple argillite.

The outwash in Clearwater Valley is part of a long, narrow, pitted outwash plain that was formed by south-flowing meltwaters derived chiefly from the waste of a trunk glacier which occupied Clearwater Valley. Seeley Lake, and undrained depressions in this outwash plain, were formed when large ice blocks melted and permitted the overlying sand and gravel to collapse into the resulting voids.

Qofa Outwash Fan deposited by older ice—Broad, fan-shaped, even-surfaced deposit of moderately well sorted silt, sand, and gravel. Locally covered by thin layer of alluvium. Clasts range in shape from subangular to well rounded with most being well rounded. Sizes range from 3 mm to 30 cm (1/8-12 in.); dominant sizes range from 13 mm to 9 cm (1/2-3 1/2 in.). Tan quartzite and sandstone clasts predominate; other prominent types include green, gray, and purple argillite. Many well rounded cobbles and a few rounded boulders 0.5 to 2 m (1 1/2 to 6 ft) scattered through the deposit. Formed by meltwaters that flowed in former outwash channels


Qto Till deposited by older ice--In northern part of quadrangle forms a hummocky moraine characterized by a striking knob-and-kettle topography. Light brown to reddish brown; consists of a heterogeneous mixture of gravel, cobbles, and boulders in a sandy matrix. Clasts range in shape from angular to well rounded; most are subangular. Most clasts range from 13 mm to 6 cm (1/2-2 1/2 in.) across. The surface of the till is locally dominated by clasts of tan quartzite and sandstone, but locally these decrease in number, and there then appear to be about equal numbers of clasts of quartzite and argillite (gray, green, and purple). Boulders, 35-51 cm (14-20 in.) across are common, and many large subangular glacial erratics 1-1.5 m (3-5 ft) are scattered through the till and along the surface. The local changes in composition of the till may be due to the waste of tributary glaciers from Deer and Fawn Creeks. These glaciers flowed eastward to merge with the trunk glacier in Clearwater Valley, and when they melted their debris reflected the different source areas tapped by each glacier. In the southern part of the quadrangle the till forms a gently sloping terrain, and lacks knob-and-kettle topography. Till is disarticulated, and tan with a faint pink cast; consists of an unsorted mixture of gravel, cobbles, and boulders in a silty to sandy matrix. Locally matrix is clayey. Clasts range in shape from angular to rounded; most are subangular. Sizes range from 3 mm to 25 cm (1/8-10 in.). Tan quartzite and sandstone clasts predominate; and prominent types include green, gray, and purple argillite. A few small rounded boulders 0.6-1 m (2-3 ft) across are scattered through till. Till lacks the large cobbles and many boulders and glacial erratics so common in the till of the northern part of the quadrangle. Till apparently was deposited by glaciers flowing southeastward more


Qtor Rubble from the course of the Pielco Creek
is derived from till deposited by older ice-thin,
discontinuous veneer and rubble derived from
widespread erosion of till of the older ice
leaving bedrock widely exposed; few scattered
erratics. Elsewhere the till forms small
patches of irregular shape and thickness. In
general, the upper contact marks the highest
limit of the till patches

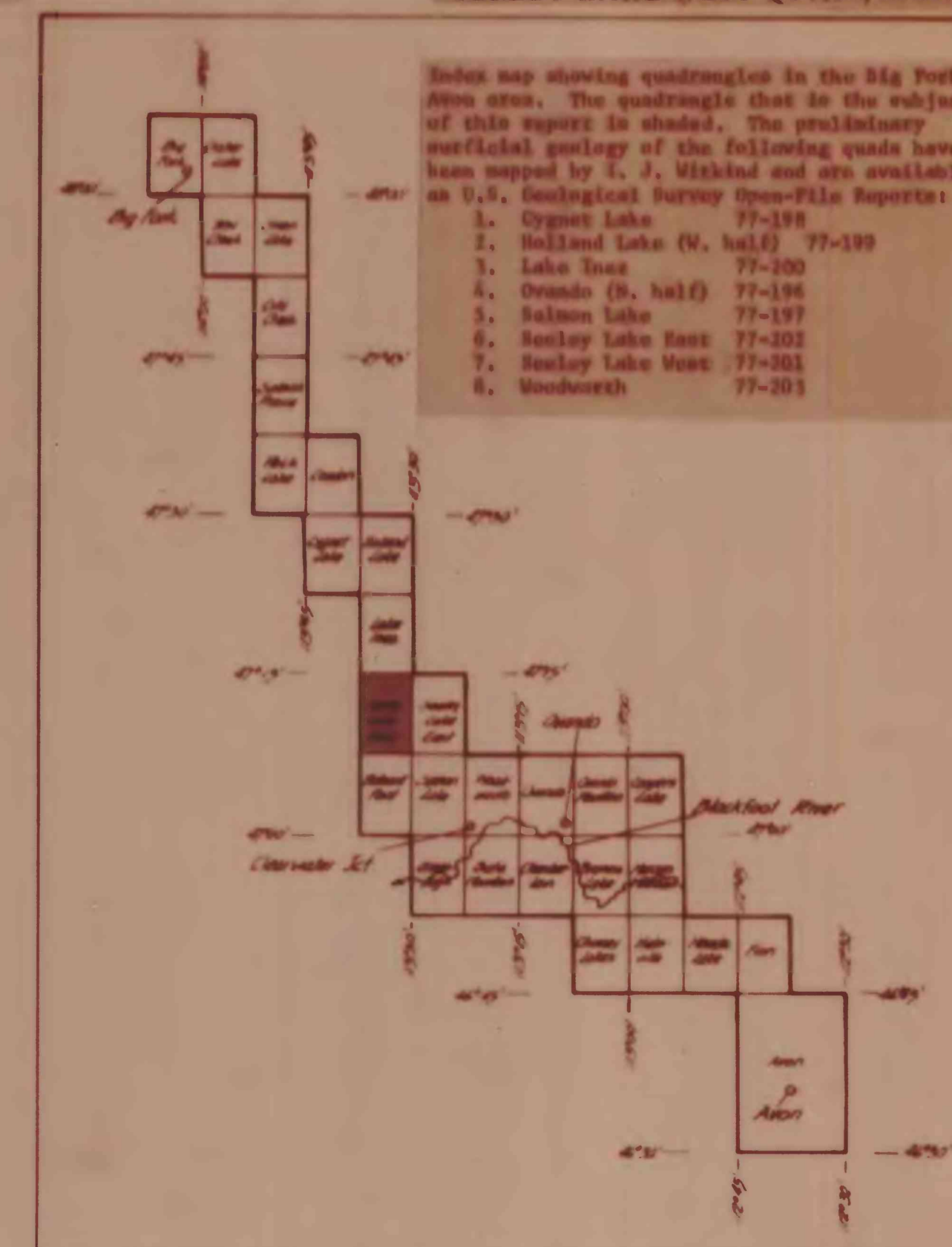
p6b OLDER BEDROCK OF BELT SUPERGROUP, UNDIVIDED
(PRECAMBRIAN) --Consists of various units of the
Belt Supergroup, chiefly the Snowplow (garnetite
and sandstone), the Engadine (quartzite and dolomite),
and Mount Shickel (argillite and sandstone)
Formations. These are bright units in varying
shades of red, maroon, green, tan, and gray

CONFIDENTIAL--Approximately located or inferred. In many places somewhat concealed by debris or dense foliage

FAULT

 West of highway 209--Dashed where approximately located or inferred; dotted where concealed. Arrows indicate relative horizontal direction of movement of fault sides.

 East of highway 209--Dotted where concealed; approximately located or inferred. U, upthrown side; D, downthrown side



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